AJEENKYA
D Y PATIL UNIVERSITY

Summer Term Examinations (June/July 2019)

School: School of Engineering **Program: B Tech (MACT/DS/CTIS)**

Course: Mechanics **Course Code: ENG107**

Semester: Summer **Max Marks: 50** **Duration (mins): 120 mins**

Instructions:

(1) Attempt Q. No.1or 2, Q. No 3 or 4, Q. No.5 or 6, Q. No 7 or.8, Q No. 9 or 10
(2) Figures to the right indicate full marks.
(3) Use of non-programmable pocket size scientific calculator is Permitted.
(4) Neat diagram must be drawn wherever necessary.
(5) Assume suitable data, if necessary and mention it clearly in answer.

Q1) A horizontal line PQRS is 12 m long, where PQ= QR = RS = 4 m. Forces of 1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90°, 60°, 45° and 30° respectively with PS. Find the magnitude, direction and position of the resultant force. (Refer fig no 1) **[10]**

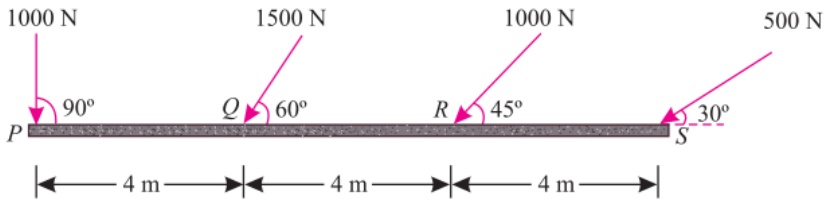

Fig. No 1

OR

Q2) The following forces act at a point : (Refer fig 2) **[10]**
(i) 20 N inclined at 30° towards North of East,
(ii) 25 N towards North,
(iii) 30 N towards North West, and
(iv) 35 N inclined at 40° towards South of West.
Find the magnitude and direction of the resultant force.

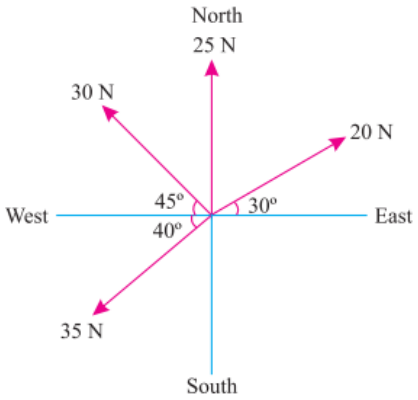

Fig. No. 2

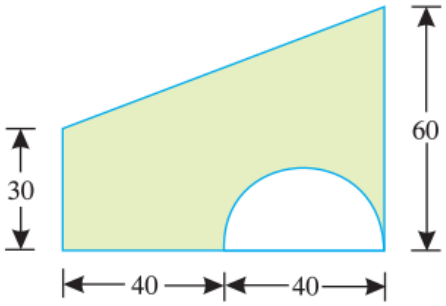

Fig. No. 3

Q3) A semicircular area is removed from a trapezium as shown in Fig. No. 3 (dimensions in mm). Determine the centroid of the remaining area (shown hatched). **[10]**

OR

Q4) A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig.4. Find the position of the centre of gravity of the figure no 4 **[10]**

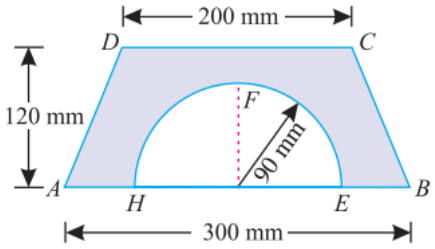

Fig. No. 4

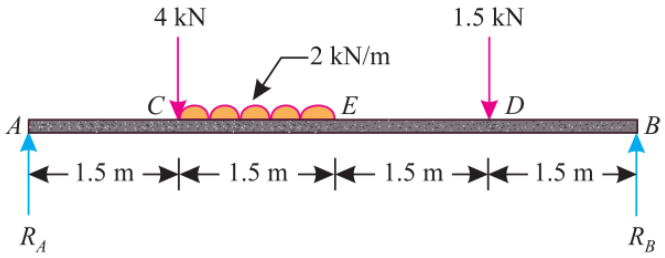

Fig. No. 5

Q5) A simply supported beam, AB of span 6 m is loaded as shown in Fig no 5. Determine the reactions R_A and R_B of the beam. **[10]**

OR

Q6) A beam AB of span 3m, overhanging on both sides is loaded as shown in Fig no 6. Determine the reactions at the supports A and B. **[10]**

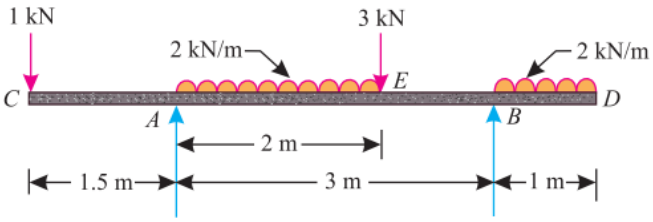

Fig No 6

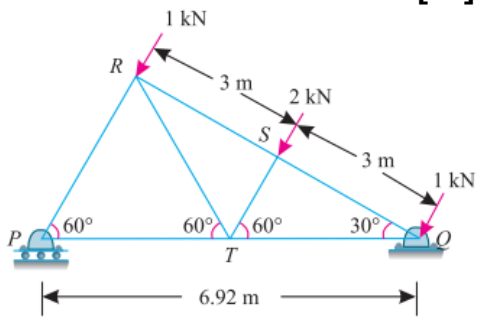

Fig No 7

Q7) Fig.no 7 represents a north-light roof truss with wind loads acting on it. Determine the reaction at P and Q. **[10]**

OR

Q8) Knowing that the maximum tension in cable ABCD (as shown in fig no 8) is 15 kN, determine a) Sag Y_B b) Sag Y_C **[10]**

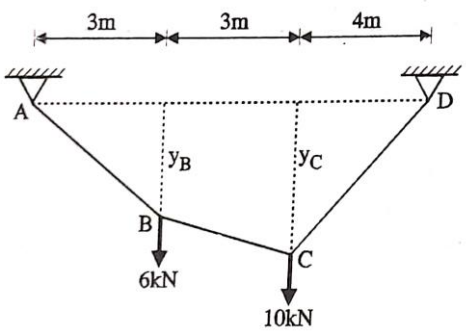

Fig No 8

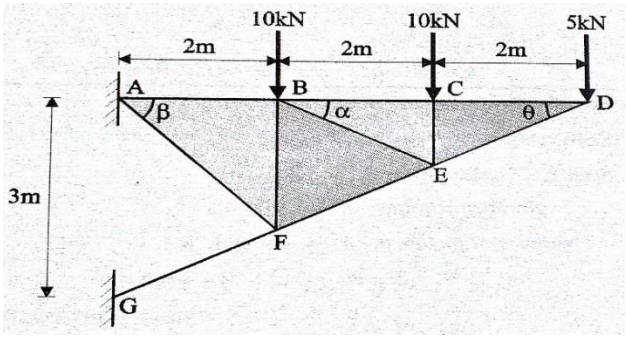

Fig No 9

Q9) Find out the forces in all the members of truss shown in fig no 9. **[10]**

OR

Q10) A projectile is fired with a velocity of 50 m/s on horizontal plane. Find its time of flight in the following three cases. **[10]**

a) Its range is 4 times the maximum height.
b) Its maximum height is 4 times the horizontal range.
c) Its maximum height and horizontal range are equal.